REMARKS

1. Claims 11-13 and 33 stand rejected to under 35 U.S.C. 103(a) as being obvious in view of U.S. Patent No. 6,545,785 to Heflinger et al. and U.S. Patent No. 7,139,545 to Drentea et al.

2. Claims 6, 9-10, 23, 26-27, 31 and 34 stand rejected to under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Application Publication No. 2005/0018724 to Da Silva and in view of U.S. Patent No. 6,545,785 to Heflinger et al.

3. Claims 16-17 and 19 stand rejected to under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Application Publication No. 2005/0018724 to Da Silva and in view of U.S. Patent Application Publication No. 20020075539 to Iida et al.

4. Claim 20 stands rejected to under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Application Publication No. 2005/0018724 to Da Silva and in view of U.S. Patent Application Publication No. 20020075539 to Iida et al and further in view of U.S. Patent No. 6,487,329 to Foltzer et al.

5. Claims 1-5 and 28-30 are allowable over the prior art of record.

6. Claims 18, 21, 22, 32, and 35 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

7. Claims 1-6, 9-13, 16-23 and 26-35 are currently pending in the Application. Claims 6, 11, 16, 21, 23 and 33 have been amended. No new matter has been added.

Rejections under 35 U.S.C §103 (a)

Claims 11-13 and 33 stand rejected to under 35 U.S.C. 103(a) as being obvious in view of U.S. Patent No. 6,545,785 to Heflinger et al. and U.S. Patent No. 7,139,545 to Drentea et al.

Claim 11

Applicant submits that the Examiner has not shown that Heflinger and Drentea disclose, suggest or teach, *inter alia*, the following features recited by claim 11 of the present application:

11. An optical data receiver comprising:

a first demultiplexer for demultiplexing modulated signals on at least a first optical path;

a second demultiplexer for demultiplexing unmodulated signals on at least a second optical path; and

at least one receiver segment, said at least one receiver segment and any additional receiver segments including at least:

a photodetector for detecting demultiplexed modulated signals on the at least first optical path;

a photodetector for detecting demultiplexed unmodulated signals on the at least second optical path;

a filter array associated with each photodetector in each segment, the filter array selecting a desired modulated tone on the at least first optical path and an associated desired unmodulated tone on the at least first optical path, the associated desired unmodulated tone being between discrete optical tones generated by an optical comb generator; and

a mixer for detecting the filtered demultiplexed modulated signals and the filtered demultiplexed unmodulated signals to recover at least a portion of data provided by a data source. (emphasis added)

Although the Examiner concedes that Heflinger and Drentea do not disclose multiple receiver segments (i.e. at least two demultiplexers on at least two optical paths), the Examiner alleges that it would have been obvious to implement multiple receiver sections in the receiver system as disclosed by Heflinger. (pg. 3, lines 17-21 of the Office Action).

Applicant respectfully traverses the Examiner's assertion that it would have been obvious for one skilled in the art to include "*a first demultiplexer for demultiplexing modulated signals on at least a first optical path; a second demultiplexer for demultiplexing unmodulated signals on at least a second optical path*" as recited in claim 11 in view of Heflinger and Drentea.

According to Heflinger's Figure 1, reproduced below, the receiver 8 requires three inputs, 24, 30 and 54, to work. Heflinger specifically teaches that a signal entering photodetector 60 is a combination of signal 30 and a portion of signal 24 (c. 5, ll. 21-28 of Heflinger). Heflinger also specifically teaches that a signal entering photodetector 75 is a combination of signal 54 and a remaining portion of signal 24 (c. 6, ll. 15-21 of Heflinger).

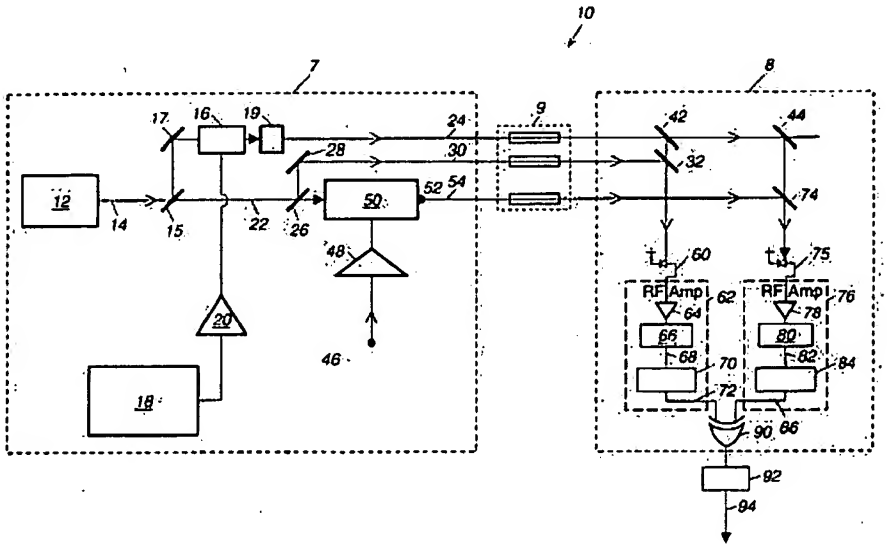

Figure 1

If one skilled in the art was to use multiple receivers 8 as alleged by the Examiner, it would mean that each of the three inputs, 24, 30 and 54, would have to be demultiplexed by a separate

demultiplexer. This would require three demultiplexers, not "*a first demultiplexer for demultiplexing modulated signals on at least a first optical path; a second demultiplexer for demultiplexing unmodulated signals on at least a second optical path*" as recited in claim 11.

Further during the telephone conference with the Examiner on February 21, 2008, the Examiner indicated that Heflinger's devices 42 and 74 may teach two demultiplexers. Applicant respectfully notes that device 74 is actually a beam combiner that combines signals 24 and 54 (c. 6, ll. 18-19 of Heflinger). Because combiner 74 combines signals 24 and 54, combiner 74 cannot be a demultiplexer as alleged by the Examiner. Beam combiner 32 is also not a demultiplexer for the same reason. It is well known in the art that a beam combiner is not a demultiplexer. Also device 42 is a beam splitter, not a demultiplexer.

However, assuming arguendo that device 74 is a demultiplexer, Heflinger teaches that device 74 combines a frequency shifted beam 24 (col. 4, line 43) and a phase modulated communication beam 54 (col. 5, line 1; col. 6, lines 18-20). The frequency shifted beam 24 corresponds to the unmodulated signal of the present application, and as recited in claim 11. Thus, if a person skilled in the art thought that beam combiner 74 was a demultiplexer (an unlikely conclusion, as discussed above) the person would learn from Heflinger that one demultiplexer (device 74) is used to demultiplex both a modulated signal and an unmodulated signal. This teaches away from the present invention as recited in claim 11, which recites in part: "*a first demultiplexer for demultiplexing modulated signals on at least a first optical path; a second demultiplexer for demultiplexing unmodulated signals on at least a second optical path*".

Heflinger teaches that the phase modulated communication beam 54 only connects to device 74, and because device 74 has both a modulated signal and an unmodulated signal as inputs, Heflinger teaches away from claim 11.

Further, Heflinger in col. 5, lines 59-64 teaches that 66 in FIG. 1 is a Schmidt trigger that converts the sinusoid into a digital signal. In col. 6 lines 44-46, Heflinger teaches that 80 in FIG. 1 is also a Schmidt trigger that converts the sinusoid into a digital signal. In col. 7 lines 19-20 Heflinger teaches that 90 in FIG. 1 is an exclusive OR gate.

Thus Heflinger does not teach "*a mixer for detecting the filtered demultiplexed modulated signals and the filtered demultiplexed unmodulated signals to recover at least a portion of data provided by a data source*" as recited in claim 11. It is well known in the art that an exclusive OR gate, which operates on digital signals, is not a mixer, which operates on analog signals.

Thus, again, Heflinger teaches away from the present invention.

In view of the above, Applicant submits that claim 11 is patentable over the cited art and should be allowed by the Examiner.

Claims 12-13 and 33

Claims 12-13 and 33, at least based on their dependency on claim 11, are also patentable over the cited art.

Claims 6, 9-10, 23, 26-27, 31 and 34 stand rejected to under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Application Publication No. 2005/0018724 to Da Silva and in view of U.S. Patent No. 6,545,785 to Heflinger et al.

Claim 6

Applicant submits that the Examiner has not shown that Heflinger and Da Silva disclose, suggest or teach, *inter alia*, the following features recited by claim 6 of the present application:

6. An optical data transmitter comprising:

(a) an optical comb generator for generating a comb of discrete optical tones;

(b) at least one transmitter segment, said at least one transmitter segment and any additional transmitter segments including at least:

(i) an array of lasers, with each laser in the array of lasers in each segment being injection locked to an optical tone in the comb generated by the optical comb generator;

(ii) a data source providing data for modulating the light generated by a majority but less than all of the lasers in the array of lasers in each segment;

(iii) a frequency shifter for frequency shifting at least one laser in the array of lasers in each segment, the frequency shifter shifting cooperating with the at least one laser in the array of lasers in each segment to generate a frequency-shifted unmodulated reference signal which occurs in the frequency domain between the discrete optical tones generated by the optical comb generator;

(c) a first multiplexer for combining outputs of the modulated lasers onto a first optical path; and

(d) a second multiplexer for combining frequency-shifted unmodulated reference signals onto a second optical path. (emphasis added)

Although the Examiner concedes that Heflinger and Da Silva do not disclose at least an additional transmitter segment which is used to create at least two optical paths as Da Silva and Heflinger only disclose one transmitter segment (page 6, lines 9-12 of the Office Action), the Examiner alleges that it would have been obvious to implement multiple transmitter sections in the transmission system as disclosed by Da Silva in view of Heflinger.

Applicant respectfully traverses the Examiner's assertion that it would have been obvious for one skilled in the art to include "*a first multiplexer for combining outputs of the modulated lasers onto a first optical path; and a second multiplexer for combining frequency-shifted unmodulated reference signals onto a second optical path*" as recited in claim 6 in view of Da Silva and Heflinger.

Da Silva in FIG. 1 teaches that all of the outputs of the modulators 61 to 6n are output via the N x 1 Coupler 11. Da Silva does not teach *"a second multiplexer for combining frequency-shifted unmodulated reference signals onto a second optical path"*.

Heflinger teaches no multiplexers at all in the optical transmitter 7. Each signal in Heflinger is output separately from optical transmitter 7, including frequency shifted beam 24 (col. 4, line

43), a phase modulated communication beam 54 (col. 5, line 1), and reference beam 30 (col. 5 lines (16-20).

Thus, there is no teaching, suggestion or motivation in Da Silva and Heflinger for "*a first multiplexer for combining outputs of the modulated lasers onto a first optical path; and a second multiplexer for combining frequency-shifted unmodulated reference signals onto a second optical path*", as recited in claim 6.

In fact Heflinger teaches away from claim 6 by teaching that the frequency shifted beam 24 and the reference beam 30, both of which are unmodulated, are output separately from the optical transmitter 7 rather than being multiplexed as recited in claim 6.

In view of the above, Applicant submits that claim 6 is patentable over the cited art and should be allowed by the Examiner.

Claims 9, 10 and 31

Claims 9-10 and 31, at least based on their dependency on claim 6, are also patentable over the cited art.

Claim 23

Applicant submits that the Examiner has not shown that Heflinger and Da Silva disclose, suggest or teach, *inter alia*, the following features recited by claim 23 of the present application:

23. A data transmitter comprising:

(a) *an optical comb generator for generating a comb of discrete optical tones having a frequency spacing equal to Δf;*

(b) at least one transmitter segment, said at least one transmitter segment and any additional transmitter segments including at least:

(i) an array of lasers, with each laser in the array of lasers in said at least one segment being injection locked to an optical tone in the comb generated by the optical

comb generator;

(ii) a data source providing data for modulating the light generated by at least a majority but less than all of the lasers in the array of lasers in each segment; and

(iii) *a frequency shifter for frequency shifting at least one laser in the array of lasers in each segment, the frequency shifter cooperating with the at least one laser in the array of lasers in said at least one segment to generate a frequency-shifted unmodulated reference signal which is shifted by a value greater than 0 hertz and less than Δf.* (emphasis added)

Support for the amendment to claim 23 is found on pages 10-11 of the present application.

Applicant respectfully submits that it would not have been obvious for one skilled in the art to include "*an optical comb generator for generating a comb of discrete optical tones having a frequency spacing equal to Δf*" and "*a frequency shifter for frequency shifting at least one laser in the array of lasers in each segment, the frequency shifter cooperating with the at least one laser in the array of lasers in said at least one segment to generate a frequency-shifted unmodulated reference signal which is shifted by a value greater than 0 hertz and less than Δf*", as recited in claim 23 in view of Da Silva and Heflinger.

Heflinger teaches in col. 4, lines 18-27 that: "In the case of using a Mach-Zehnder modulator as an optical frequency shifter, the modulator is biased at the minimum light transmission so that the delivered light will be directed into just the upper and lower side bands at an optical frequency that is shifted either up or down by the RF. By filtering this light with a narrow pass band optical filter 34, such as a Fabry-Perot filter or a Bragg grating filter, it is possible to extract just the light that is either upshifted or down shifted in frequency. For the Mach-Zehnder modulator, the RF signal can be as high at 40 GHz."

Da Silva on page 3 paragraph [0036] line 4-6 teaches that the comb 3A central frequency is set by the reference laser source 2 frequency. Further Da Silva teaches on page 1 paragraph [0009] that it is well known that with a stable oscillator of frequency f_b that the reference frequency is greater than f_b.

On page 5 line 22 to page 6 lines 1-8 of the Office Action the Examiner states that the motivation for multiplexing the un-modulated frequency shifted signal disclosed by Helfinger with the multiplexed data modulation signals of Da Silva would have been to reduce linear distortion. Nothing in the present application teaches or suggest reducing linear distortion. Thus, the Applicant disagrees with the motivation suggested by the Examiner.

Further, the Applicant submits that neither Heflinger and/or Da Silva teach or suggest claim 23. In fact Da Silva teaches away from claim 23 by teaching on page 3 paragraph 0036 that the comb central frequency is set by the reference laser source 2 frequency and that the comb line spacing is set by the microwave reference source 1. There is no teaching in Helflinger and/or Da Silva that teaches or suggests or makes obvious "*an optical comb generator for generating a comb of discrete optical tones having a frequency spacing equal to Δf*" and "*a frequency shifter for frequency shifting at least one laser in the array of lasers in each segment, the frequency shifter cooperating with the at least one laser in the array of lasers in said at least one segment to generate a frequency-shifted unmodulated reference signal which is shifted by a value greater than 0 hertz and less than Δf*", as recited in claim 23. Da Silva does not teach setting the comb line spacing to *Δf* and generating an unmodulated reference signal shifted by a value greater than 0 hertz and less than Δf.

In view of the above, Applicant submits that claim 23 is patentable over the cited art and should be allowed by the Examiner.

Claims 26-27 and 34

Claims 26-27 and 34, at least based on their dependency on claim 23, are also patentable over the cited art.

Claims 16-17 and 19 stand rejected to under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Application Publication No. 2005/0018724 to Da Silva and in view of U.S. Patent Application Publication No. 20020075539 to Iida et al. .

Claim 16

Applicant submits that the Examiner has not shown that Da Silva and Iida disclose, suggest or teach, *inter alia*, the following features recited by claim 16 of the present application:

16. A method of optically modulating and transmitting source data comprising:

(a) generating an optical comb comprising optical tones having a frequency spacing equal to Δf;

(b) modulating selected ones of the optical tones in the optical comb according to the source data to produce a comb of modulated optical tones;

(c) frequency shifting at least one optical tone in the optical comb by a frequency less than Δf to produce a frequency shifted unmodulated optical reference tone;

(d) multiplexing the modulated optical tones onto a first optical path; and

(e) multiplexing the frequency shifted unmodulated optical reference tones onto a second optical path. (emphasis added)

Although the Examiner concedes that Da Silva does not disclose multiplexing the optical comb, the frequency shifted unmodulated optical reference tone and the comb of modulated tones onto one optical path, the Examiner alleges that it would have been obvious to implement the system and method of multiplexing of a reference signal and data signals onto a single optical path as taught by Iida in the optical transmission system as disclosed by Da Silva.

Applicant respectfully submits that it would not have been obvious for one skilled in the art to include "*multiplexing the modulated optical tones onto a first optical path; and multiplexing the frequency shifted unmodulated optical reference tones onto a second optical path*", as recited in claim 16 in view of Da Silva and Iida.

As stated by the Examiner on page 8 lines 3-16 of the Office Action, Da Silva does not teach such multiplexing. On page 8 lines 7-10 of the Office Action, the Examiner admits that on page 2 paragraph 29 and Fig. 6 reference number 20, Iida teaches multiplexing of a reference signal from 112 and a modulated signal from mixer 111 onto a single optical path 20. Thus Iida in fact teaches away from claim 16 that recites "*multiplexing the modulated optical tones onto a first optical path, and multiplexing the frequency shifted unmodulated optical reference tones onto a second optical path*".

In view of the above, Applicant submits that claim 16 is patentable over the cited art and should be allowed by the Examiner.

Claims 17, 19 and 20

Claims 17, 19 and 20, at least based on their dependency on claim 16, are also patentable over the cited art.

In view of the above, Applicants submit that the application is now in condition for allowance and respectfully urges the Examiner to pass this case to issue.

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The Commissioner is authorized to charge any additional fees which may be required or credit overpayment to deposit account no. 12-0415. In particular, if this response is not timely filed, the Commissioner is authorized to treat this response as including a petition to extend the time period pursuant to 37 CFR 1.136(a) requesting an extension of time of the number of months necessary to make this response timely filed and the petition fee due in connection therewith may be charged to deposit account no. 12-0415.

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